

## OPERATING DEVICE FOR REAR SIDE WINDOWS ON CABRIOLET VEHICLES

This is an operating device comprising of at least one  
5 sliding part operated by an electrical motor using cables as  
is normal in the technique. The slider on the operating  
device is attached by any suitable means to the lower part  
of the cabriolet vehicle window for example using a holding  
clamp. This sliding device may slide along a rail which  
10 defines the trajectory of the window it is operating.

Due to the shape of the vehicle, the trajectory of the  
rear side windows on cabriolet vehicles is usually curved  
with at least one inflection. This means that mechanisms to  
operate these windows are complex and costly.

15 In accordance with the invention there are two  
fundamental design parameters which may very simply solve  
the problems encountered in devices described above. These  
parameters directly concern the trajectory which the vehicle  
window follows and are: the angle of departure formed by the  
20 vertical and initial upper curvature of the rail: and the  
radius of curvature for this trajectory, which logically  
corresponds to the curvature of the device's rail.

In particular, operating tests have shown that the  
angle of departure must be between  $+45^\circ$  and  $-45^\circ$  and that  
25 the aforementioned radius of curvature must be in the  
interval between  $\infty$  (straight trajectory) and 500 mm.

With this operating device for the side rear windows on  
cabriolet vehicles in the invention, it is possible to have  
one single rail; thereby structurally simplifying the  
30 overall mechanism. Also, the invention means that this

single rail has a trajectory with several curved sections with corresponding curvatures.

There are important advantages from the above features. Firstly, the cost is drastically reduced, because operating  
5 devices of this type of window has a rail with three guides to operate the glass due to the trajectory (curved and with inflections) which has been described in its operation. Moreover, the invention has one single rail with the  
10 aforementioned parameters in a simpler configuration to reduce development and design time. As a consequence of the simplification of the device, noise and operating vibrations are reduced.

The device in the invention also includes ways of adjusting the position with regard to the vehicle's door  
15 formed by an upper swivel axis on the rail which allows the device to tilt slightly in order for it to adjust to the vehicle's door. It also has at least two lower transversal screws to laterally adjust the device's position and at least one screw in the slider to allow the glass to be  
20 positioned with regard to the overall slider -- rail mechanism.

The features and advantages of the device in this invention shall become clearer from the detailed description of a preferred implementation. This description  
25 is given hereinafter as a non-limiting example with reference to the drawings.

In these drawings:

Figure 1 is a side view of the operating device for rear side windows in cabriolet cars in accordance with the  
30 invention showing the aforementioned device without the window for reasons of clarity.

Figure 2 is a front view of the side window operating device from figure 1.

Figures of 3 to 5 are side views showing the sequence of movements of the window when the device is operating.

5       The operating device (1) which is shown by way of an example, comprises a sliding piece (2) equipped with a clamp to hold the lower edge of the window (4) on the cabriolet vehicle as shown in Figures 3 to 5 of the attached drawings. The sliding piece (2) is operated by cables (5) and an  
10       electric motor (6) which moves along the rail (7). The rail (7) for the device (1) defines the mainly curved trajectory which the window must follow (4) in its operation following the different positions shown in Figures 3, 4 and 5.

      In Figure 1, the two main parameters for the window's  
15       (4) trajectory upwards and downwards are defined. These are:

      ( $\infty$ ): angle of departure formed by the vertical and initial upper curvature of the rail (7): and

      (R): for the rail trajectory (7) from the centre of the  
20       curve (C).

      In accordance with tests carried out, it has been found that the angle of departure ( $\infty$ ) must be between + 45° and - 45° and that the radius of curvature (R) must be between  $\infty$  (straight rail (7)) and 500 mm (maximum rail curve).

25       There are ways of adjusting the position in terms of the vehicle's door (not shown). These methods comprise an upper swivel axle (8) on the rail (7). This upper swivel axle (8) also acts as a fixing axle and allows the rail (7) to tilt slightly to adjust it in the vehicle's door.  
30       Adjustment also includes 2 lower transversal screws (9, 10) which operate to laterally regulate the position of the

device. Finally the aforementioned adjustment includes screws (in 11, 12 a) on the slider as shown in Figures 3 and 4, which allow the glass to be adjusted with regard to the rail -- slider (7, 2) equipment on the device (1).

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The means of adjusting the position with regard to the vehicle's door allow the device (1) to be widely fitted to the vehicle, which easily compensates for any likely deviation from the design as well as operating wear and tear and tolerances.

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Having sufficiently described how the operating device for rear side windows on cabriolet vehicles is formed for this invention using the attached drawings, it is understood that any modification to the detail of the mention which is judged to be suitable may be made whenever the essential features of the summarised invention in the following claims are not altered.

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